Transportation Capital Facilities Plan

2005—2030

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There are many contributors and parties that were integral in completing this Transportation Capital Facilities Plan (CFP) for Cottonwood Heights. This plan document was sponsored by and completed under the direction of the Cottonwood Heights City Council and Mayor Kelvyn H. Cullimore, Jr. City Staff was invaluable in supplying direction and information throughout the duration of this study. Foremost among these are Liane Stillman (City Manager), Kevin Smith (Community Development Director), Brad Gilson (City Engineer, Gilson Engineers), and Michael Black (City Planner). Outside entities that provided information for and assisted in the development of this plan were the Salt Lake County Public Works department and the Wasatch Front Regional Council (WFRC).

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Executive Summary

This Transportation Capital Facilities Plan (CFP) has been developed to allow Cottonwood Heights to properly plan and budget for essential existing and future transportation needs. Since incorporation in January of 2005, the City has been diligently updating its General Plan while moving forward with pavement rehabilitation as provided under contract by Salt Lake County. The CFP has evaluated the condition of and identified the need for improvements to all facets of transportation, including:

- ***Traffic Capacity*** – The ability of the existing roadway facilities to accommodate existing and future traffic needs. Aside from the projects identified on the Wasatch Front Regional Council (WFRC) STIP, Fort Union Blvd needs intersection improvements at Union Park Avenue, 1300 East, and 2000 East.
- ***Traffic Signals*** – Evaluation of existing signalized intersections to meet current and future standards for traffic conveyance and pedestrian safety. Most of the improvements relate to upgrading the signal and pedestrian heads, pedestrian facilities, and intersection geometrics.
- ***Traffic Calming*** – A discussion concerning the different types of traffic calming devices available is provided.
- ***Truck Routes*** – A truck route map is provided that defines those roadways that should be designated.
- ***Sidewalks*** – A street by street inventory of existing sidewalk conditions, including curb and gutter was conducted. Emphasis was placed on those routes identified on the Safe Walking Plan.
- ***Street Lights*** – An inventory and condition evaluation of existing street lights was conducted. With a few notable exceptions, such as Meadow Drive, most existing street lights were found to be in good condition. The street light map identifies these locations.
- ***Bridges*** – There are thirteen bridges in the City in various conditions. The bridges were inspected and suggested repairs identified. A projection of service life was estimated for replacement of all bridges over the long term. One city-owned bridge on Creek Road needs repairs within the next four years.
- ***Pavement Maintenance and Rehabilitation*** – A review of Salt Lake County's pavement condition inventory was conducted to determine its validity. Particular attention was given to updating their projected conditions to present day and assigning an appropriate repair solution. An average $826,000 annual budget should accommodate most of the City's pavement maintenance over a five year cycle.
- ***Additional Capital Street Projects*** – These projects represent staff or consultant recommendations that don't fit into any specific category above. Their justification comes from the experience of the community over initial start-up this year.

Table E.1 summarizes both the short-term (2006-2010) and the long term (2011-2030) improvements for each transportation category identified above. Figure E.1 exhibits the annual total project costs from 2006-2010 as well as the average annual cost over the five years adjusted at a 3.1% annual inflation rate. Dates for implementation are given as the year in which work will occur, beginning with the July 1 fiscal period. For example: 2006 projects will begin in July 2006. This document is for planning purposes only and does not constitute a required course of action. Determination of actual project work in any given year will be established by the City. The project years shown in this document are only a recommendation and may vary from the year that projects are actually completed.

Table E.1. Priority Improvements by Type, 2006-2030

	Priority Year	
Improvements	2006-2010	2011-2030
Traffic Capacity	$1,200,000	$3,150,000
Traffic Signal	$814,928	0
Sidewalks and Curb & Gutter	$377,733	$1,000,000*
Street Lights	0	0
Bridges	$75,600	$4,003,365
Pavement Maintenance And Rehabilitation	$4,126,763	Ongoing
Capital Street Projects	$980,000	Ongoing
TOTALS	$7,575,024	$8,153,365

All values are in year 2005 dollars.
* Assumes $50,000/year for 20 years.

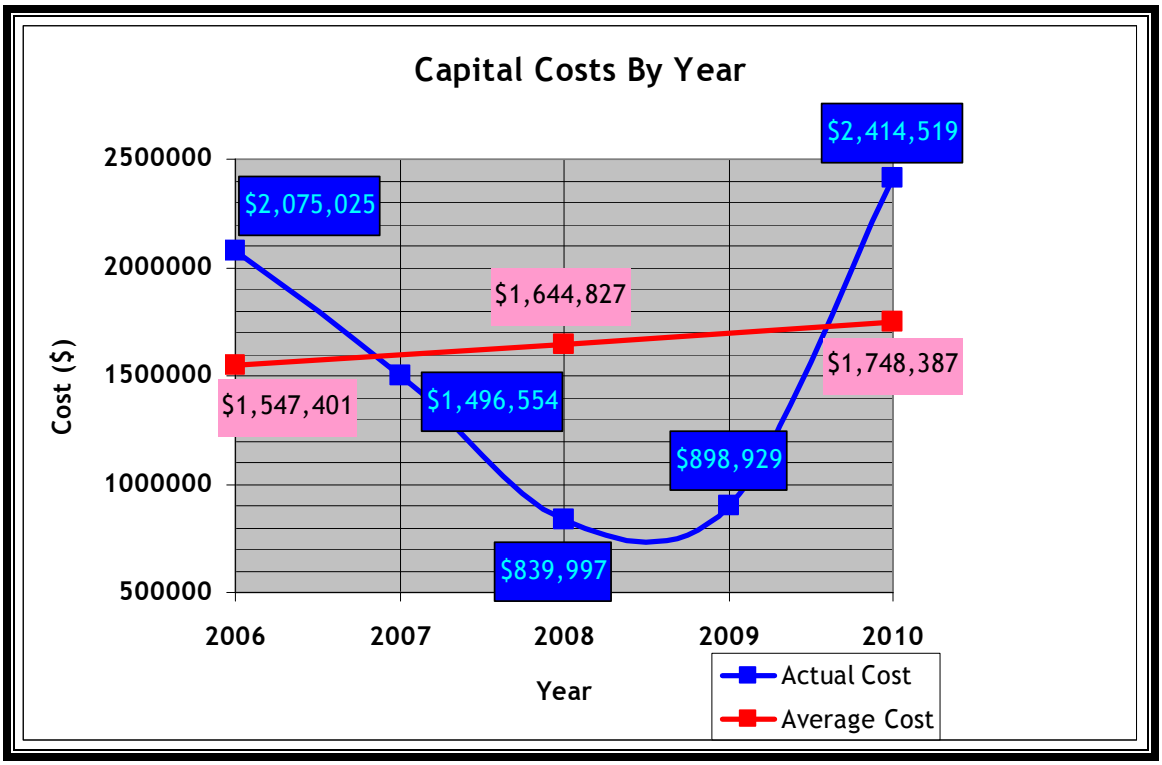


Figure E.1. Annual Total Projected Project Costs

Section 1 - Introduction

Cottonwood Heights is located south of Murray, Holladay, and I-215; east of Midvale; north of Sandy; and up against the Wasatch Mountains in the Salt Lake Valley. Figure 1.1 exhibits the location of Cottonwood Heights within the area. Figure 1.2 exhibits a close-up view of the city boundary. As Cottonwood Heights just recently incorporated in January of 2005, it is critical for the City to be aware of the condition of its transportation system so as to properly plan and budget for the essential existing and future transportation needs of the City. As such, this Transportation Capital Facilities Plan is undertaken to assess the existing condition of the transportation infrastructure in the City and provide a plan for maintaining and updating the transportation system in the future. There are many aspects of a transportation system. These include: roads, vehicle traffic, bridges, traffic control devices, intersections, truck routes, and pedestrian facilities. All of these aspects must be balanced and maintained for the benefit of the City and its residents. This document is for planning purposes only and does not constitute a required course of action. Determination of actual project work in any given year will be established by the City. The project years shown in this document are only a recommendation and may vary from the year that projects are actually completed.

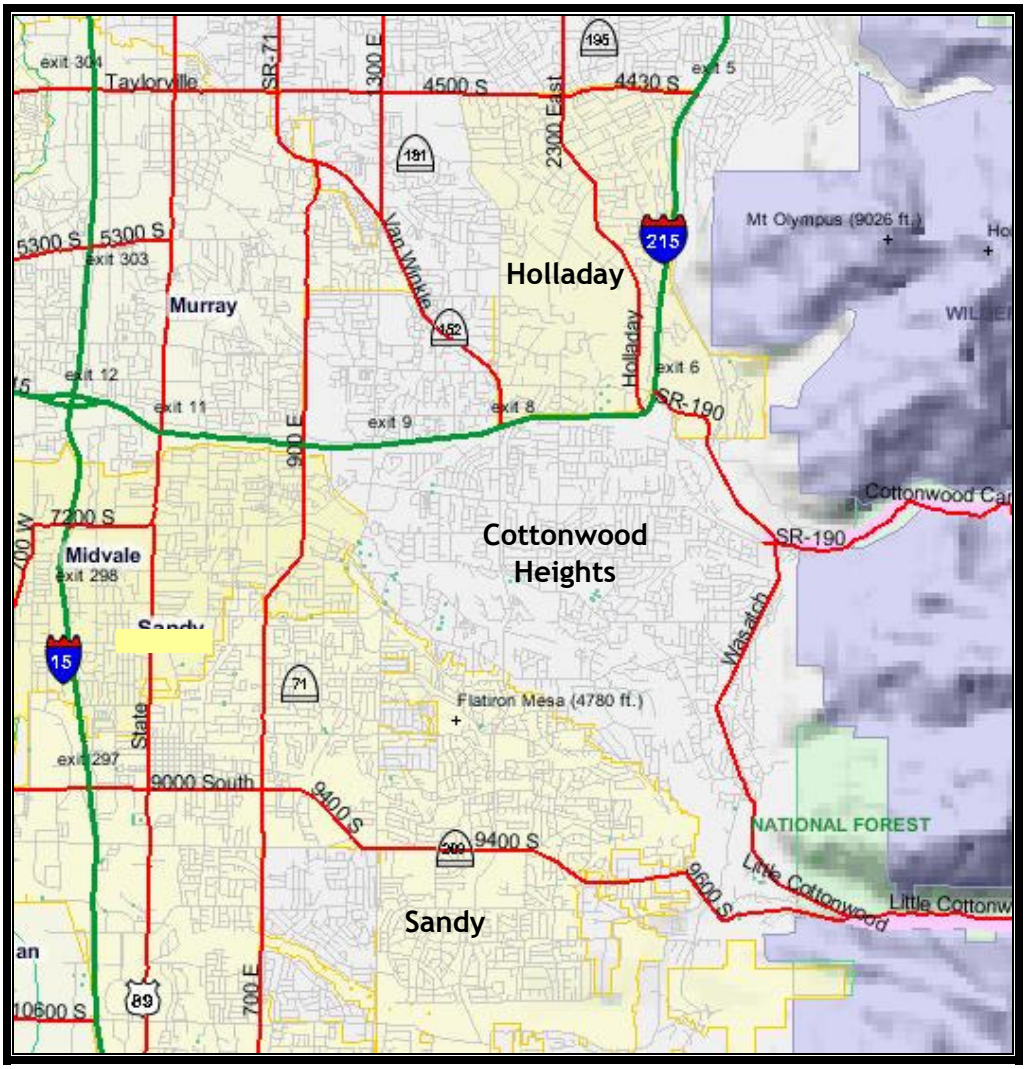


Figure 1.1. Cottonwood Heights Location Map

Figure 1.2. Cottonwood Heights Map

One of the primary purposes in identifying transportation infrastructure needs is safety. The underlying purpose of building and maintaining transportation facilities such as roads, traffic signals, bridges, pedestrian facilities, and so forth, is to provide a safe and efficient means and way for people to travel from one place to another; from home to work, school to home, etc. Keeping these facilities safe and efficient requires constant vigilance and constant adjustments. If a residential road begins to experience an increase in traffic flow that is beyond its desired use or speeding is an issue, then perhaps there are traffic calming measures that can be implemented to remedy the problem. If a sidewalk has fallen into disrepair and it is difficult or hazardous to traverse, it will need to be repaired or replaced. If traffic volumes at a stop-controlled intersection reach a certain level, other traffic control devices such as roundabouts or traffic signals may need to be considered.

With the ever increasing costs of maintaining existing facilities and constructing new facilities, it is important for the City to be able to secure funding for its infrastructure needs beyond what can be provided by the City's budget. Some external sources of funding will be discussed in this document.

The following sections will describe the conditions and recommended improvements for each transportation related facility. Estimated costs for improvements are based on year 2005 dollars and must be inflated to their given construction year for future cost. Dates for implementation are given as the year in which work will occur, beginning with the July 1 fiscal period. For example: 2006 projects will begin in July 2006.

Section 2 - Traffic Capacity Improvements

It is the desire of every City to have roadways and intersections that not only accommodate their traffic needs, but operate in an efficient and safe manner. The major corridors—including Fort Union Blvd and Highland Drive—and other areas of concern to City staff—including Creek Rd and Danish Rd—were analyzed to determine existing traffic demand and existing levels of operation as well as project the future traffic demand and levels of operation that can be expected with facilities as they now exist. This section will discuss the existing conditions, projected future conditions, and traffic needs and probable expenditures to remedy shortcomings for both.

Traffic Conditions

Traffic Volume counts were conducted at various points in the City to determine the present (year 2005) conditions. Average Daily Traffic (ADT) counts, which represent the traffic (both directions) on a given stretch of road during a 24-hour period, were taken at 12 locations in the City. PM Peak hour intersection counts, which represent the movements made by vehicles at an intersection during the peak afternoon/evening hour of the day, were conducted at 7 locations along Fort Union Blvd and at one location on Wasatch Blvd. These counts were conducted during the summer of 2005. It has been noted that during the winter ski season, possibly higher PM Peak hour traffic volumes are experienced. Further analysis during the ski season months (December through March) could be done to determine the validity of this assertion, the results of which would most likely be considered a seasonal, short term issue and not an overall capacity issue. The PM Peak hour was analyzed at the exclusion of the AM Peak hour because the PM Peak hour experiences higher overall traffic volumes than the AM Peak hour in Cottonwood Heights and it is desirable to analyze the hour with the highest traffic volumes to determine the existing worst case traffic conditions. The ADT and PM Peak hour count locations are as follows—these locations are also shown in Figure 2.1 “Existing and Future Traffic Volumes and Level-of-Service Map”:

ADT

1. Union Park Avenue between Fort Union Blvd and Creek Road
2. Creek Rd between Siesta Dr and Riverwood Dr
3. Creek Rd west of the intersection with Highland Dr
4. Creek Rd west of the intersection with Danish Rd
5. Oak Creek Dr south of the intersection with Chalet Rd
6. Bridgeport Ave east of Oak Creek Dr
7. Highland Dr north of Fort Union Blvd
8. Highland Dr north of Bengal Blvd
9. Highland Dr south of Bengal Blvd
10. Bengal Blvd east of Highland Dr
11. Bengal Blvd west of Wasatch Blvd
12. 2300 East north of Fort Union Blvd
13. 2300 East south of Fort Union Blvd
14. 2700 East between 7350 S and Banbury Rd
15. 3000 East north of Fort Union Blvd
16. Danish Rd south of Creek Rd
17. Wasatch Blvd south of Fort Union Blvd.

The descriptions of the ADT count locations (by number) above correspond to the road numbers discussed in Table 2.1.

PM Peak Hour

1. Fort Union Blvd / Union Park Ave intersection
2. Fort Union Blvd / 1300 East intersection
3. Fort Union Blvd / Park Centre intersection
4. Fort Union Blvd / 1700 East intersection
5. Fort Union Blvd / 2000 East (Highland Dr) intersection
6. Fort Union Blvd / 2300 East intersection
7. Fort Union Blvd / 3000 East intersection
8. Wasatch Blvd / Little Cottonwood Canyon Road.

Functional Classification

The functional classifications of the roads in the City follow established standards and are outlined in detail in the Transportation section of the *Cottonwood Heights General Plan* dated July 2005 and shown there in the "Roadway Classification Map". The functional classification of a roadway ranges from a local residential street to an Interstate highway. In a city, the two main classifications that are of concern when dealing with traffic are arterials—typically have 84 to 110 feet of right-of-way (ROW) with 4 to 7 lanes—and collectors—typically have 66 to 78 feet of ROW with 2 to 4 lanes. Arterials are the main roads in a city that have the function of transporting large numbers of vehicles through an area at a relatively moderate speed (35-45 mph). Some examples of arterial roadways in Cottonwood Heights are Fort Union Blvd, 1300 East, Highland Dr, and Union Park Ave. Collectors have the function of "collecting" traffic from local residential roads and dispersing them onto the arterials. Some examples of collector roadways are 2300 East, 2700 East, Bengal Blvd, 3000 East, Creek Rd, and Danish Rd. Wasatch Blvd is a state designated and maintained roadway and is therefore not considered in this "City" Capital Facilities Plan.

Traffic Analysis

Roadway Capacity Analysis

The traffic volume data that was collected was analyzed to determine where roadway and intersection capacity issues presently exist in the City as well as where future issues may occur. In conjunction with City staff, target roadways were selected for data collection and analysis. Based on collected data, future year traffic data was projected for the year 2030, which is the planning year used by the Wasatch Front Regional Council (WFRC), the regional planning organization for the area that includes the Salt Lake valley and Cottonwood Heights. Future year traffic projections were calculated using the WFRC growth estimates for the area of approximately 1 % per year. This seems reasonable considering the built-out nature of Cottonwood Heights. The overall capacities for the roadways are based on the number of lanes the road has and its functional classification as defined in the *Cottonwood Heights General Plan*. Table 2.1 shows the 2005 ADT, the 2030 projected ADT, and the roadway capacities for the major roadways of interest in Cottonwood Heights. The roads in the table are listed the same as they were numbered above.

Figure 2.1. Existing and Future Traffic Volumes and Level-Of-Service Map

Table 2.1. Average Daily Traffic Volumes and Roadway Capacity

Road No.	Road	Year 2005 ADT	Year 2030 ADT	Capacity	Year 2030 Percentage of Capacity Used
1	Union Park Ave	44,100	54,900	60,000	92 %
2	Creek Rd	10,700	13,300	20,000	67 %
3	Creek Rd	12,600	15,700	20,000	79 %
4	Creek Rd	5,700	7,100	12,000	59 %
5	Oak Creek Dr	2,200	2,700	6,000	45 %
6	Bridgeport Ave	300	400	6,000	7 %
7	Highland Dr	51,200	62,000	60,000	103 %
8	Highland Dr	34,800	43,300	53,000	82 %
9	Highland Dr	30,300	37,700	36,000	105 %
10	Bengal Blvd	12,600	15,700	36,000	44 %
11	Bengal Blvd	8,100	9,000	15,000	60 %
12	2300 East	11,700	13,000	15,000	87 %
13	2300 East	12,300	14,000	15,000	93 %
14	2700 East	7,100	8,800	12,000	73 %
15	3000 East	12,100	15,000	20,000	75 %
16	Danish Rd	2,800	3,500	12,000	29 %
17	Wasatch Blvd	22,600	28,100	32,000	88 %

This data is also exhibited in Figure 2.1. As can be seen from the data shown in Table 2.1, as far as overall roadway capacity is concerned, there are not any existing roadway capacity deficiencies among the roads that were studied. There are also not any projected future deficiencies except for Highland Drive (north of Fort Union Blvd and south of Bengal Blvd) which are both projected to be slightly over capacity. Union Park Ave and Wasatch Blvd will be nearing capacity by 2030. It should also be noted that the traffic counts for this study were conducted during the summer when school was not in session, so roads such as Bengal Blvd (which is near the High School) will undoubtedly have somewhat higher traffic volumes during these times. However, it is quite certain that these volumes will still not exceed the roadway capacities either for the existing or the future condition.

Intersection Capacity Analysis

There were eight intersections of concern to City staff along Fort Union Blvd that were included in a capacity analysis to determine if they could accommodate the existing and projected future levels of traffic efficiently. Each of the intersections is controlled by a traffic signal. Table 2.2 exhibits the intersection delay and the level of service for each of the eight intersections for both the existing and the future conditions.

Table 2.2. Level of Service and Delay

Intersection	Existing Year 2005		Future Year 2030	
	Delay (sec)	LOS*	Delay (sec)	LOS*
Fort Union/Union Park	33.1	C	67.4	E
Fort Union/1300 East	50.9	D	112.8	F
Fort Union/Park Centre **	10.2	B	16.3	B
Fort Union/1700 East	12.0	B	15.2	B
Fort Union/2000 East	70.1	E	148.4	F
Fort Union/2300 East	24.4	C	42.8	D
Fort Union/3000 East	9.2	A	9.7	A
Wasatch Blvd/Little Cottonwood	20.5	C	34.4	C
____ Exceeding Capacity				

* These LOS grades represent the intersection as a whole and are not representative of individual movements at the intersection which may vary dramatically.
** Westbound and northbound left turn movements at this intersection approach LOS E and F during peak periods.

Level-of-Service (LOS) is a means of quantitatively describing the quality of operational conditions of a roadway segment or intersection and the perception by motorists and passengers. Service levels are identified by letter designation, A to F, with LOS "A" representing the best operating conditions and LOS "F" the worst. Each LOS represents a range of operating conditions, and one or more measures of effectiveness (MOE's) are used to quantify the LOS of a roadway element. For intersections, the MOE used is average control delay (in seconds) per vehicle. While there are several methodologies for estimating the LOS of intersections, the most commonly used is that presented in the Highway Capacity Manual (HCM) and is the methodology used in this study (HCM 2000). The Highway Capacity Manual LOS criteria for signalized and unsignalized intersections are summarized in Table 2.3.

Table 2.3. Level-of-Service (LOS) Criteria for Intersections

Level of Service (LOS)	Average Control Delay (seconds/vehicle)	
	Signalized Intersections	Unsignalized Intersections
A	< =10	< =10
B	>10 - < 20	>10 - < 15
C	>20 - < 35	>15 - < 25
D	>35 - < 55	>25 - < 35
E	>55 - < 80	>35 - < 50
F	>80	>50

Source: *Highway Capacity Manual 2000*, Transportation Research Board, National Research Council, Washington, D.C., 2000.

The HCM method is based on the capacity available to service the various movements at a signalized intersection based on the amount of green time provided for each movement, the impacts of any conflicting movements, etc; for unsignalized intersections, delay is based on the availability of gaps in the major street to allow minor street movements to occur. Delay results in driver frustration and anxiety, loss of time, and increased fuel consumption.

Generally accepted standards indicate that it must be demonstrated that major intersection approaches for unsignalized intersections can operate at LOS "E" or better, however if a second access point provides access to a signalized intersection, LOS "F" may be acceptable. For a signalized intersection, an intersection LOS of "D" is acceptable.

For an urban area like Cottonwood Heights, an acceptable level of service is generally considered to be from A to D, with D being the low end of what is acceptable. The highlighted values in the table represent values that are not acceptable. For the existing year 2005 conditions, only one of the intersections—Fort Union and 2000 East (Highland Drive)—has worse than a level of service D and it has a level of service E. By 2030, two more intersections—Fort Union Blvd at Union Park and at 1300 East—will both worsen to level of service F with the Fort Union and 2000 East intersection also slipping to LOS F. For the existing problem at Fort Union and 2000 East, the main crux of the issue seems to arise from the fact that there are high volumes of left turn movements in all four directions, but only one left turn lane in each direction. If it was possible to increase left turn lane capacity by having a total of two left turn lanes in each direction the level of service and delay for the existing traffic condition would become an LOS D, an acceptable level of service, and delay of 39.3 seconds per vehicle—an almost 50% reduction in average delay. For the 2030 situation, with the two left turn lanes, the level of service would remain "F", but the average delay would be reduced from 148.4 seconds per vehicle to 91.4 seconds per vehicle—almost a full minute per vehicle. Additionally, if the signals along Fort Union Blvd can be coordinated for east-west travel, delays will decrease along with average travel time along the corridor and the levels of service will improve. A cursory attempt at coordinating these traffic signals was made as part of this study without success. A more in-depth and intensive study and analysis will most likely be required to successfully achieve a workable coordination plan.

WFRC Long Range Plan Projects

WFRC—as the regional planning organization that has responsibility for Salt Lake, Davis, Weber, Morgan, and Tooele counties—has listed a couple of projects in their Long Range Plan (LRP) that affect Cottonwood Heights. These projects are not currently funded, but when they are, then the City's estimated share of the project costs are given below. It is critical that these projects move from the LRP onto the State-wide Transportation Improvement Program (STIP)—the short range plan where funds are actually allocated to specific projects—or the City may be forced to fund them entirely. These projects are as follows:

- Wasatch Blvd – Widening project from Fort Union Blvd to the southern Cottonwood Heights Limit. Road will be widened to four lanes. This is a State road, so it will be a Utah Department of Transportation (UDOT) project and the City will not need to fund these improvements. Estimated cost to City is $0.
- Fort Union Blvd – Widening from 3000 East to Wasatch Blvd. This will most likely be programmed to receive federal and/or state funding, but will probably also require a portion to be funded by the City. Estimated cost to City is $250,000.
- 2000 East (Highland Drive) – Widening to increase capacity from Bengal Blvd to Creek Road. This will most likely be programmed to receive federal and/or state funding, but will probably also require a portion to be funded by the City. Estimated cost to City is $300,000.

Recommended Traffic Capacity Projects

After careful consideration of the traffic situation in the City, there were no new intersections identified that are expected to require the installation of a traffic signal. There are, however, intersection improvements that should be made to improve traffic flow and safety at several intersections. The three intersections of highest concern are Fort Union at Union Park, 1300 East, and at 2000 East (Highland Dr).

Fort Union Blvd at 2000 East (Highland Drive)
As mentioned earlier, short term capacity issues of this intersection can be solved by adding left turn lanes so that there are dual left turns in each direction. Long term, an additional through lane in each direction, for a total of three through lanes east and west and four through lanes north and south would bring the intersection into compliance with an acceptable level of service of D. Most likely, this is not a feasible solution for this intersection due to the amount of right-of-way that would be required to accomplish it. Estimated cost is $1.2 million (excluding right-of-way). This should be analyzed in further detail before a solution is selected.

Fort Union Blvd at 1300 East
For the long term situation at this intersection, increasing the left turn capacity to dual left turns in each direction would reduce the projected year 2030 LOS to "E": still unacceptable, but a bit better. To reach an acceptable LOS for the projected year 2030 situation, an additional through lane (in addition to the dual left turns) would need to be installed in the eastbound and westbound directions (Fort Union Blvd). This would reduce the projected level of service and delay to an acceptable level of LOS D with an average delay 44.1 seconds: about 1/3 the delay as the projected situation without improvements. Estimated cost is $900,000 for additional left turn lanes and $800,000 for additional through lanes.

Fort Union Blvd at Union Park Avenue
For the long term situation at this intersection, increasing the left turn capacity to dual left turns in each direction except for westbound Fort Union Blvd (which would remain a single left turn lane) would reduce the projected future LOS at this intersection to an acceptable level of LOS D and average vehicle delay of 54.5 seconds. This improvement would reduce the projected average delay by about 13 seconds per vehicle. Estimated cost is $900,000. This cost will most likely be shared with Midvale since Union Park Avenue is half in Midvale. Coordination of this project with Midvale will be necessary.

Recommended capital improvements for traffic capacity related projects through the year 2030 are summarized in Table 2.4 and locations are shown by year in Figure 2.2.

Table 2.4. Recommended Traffic Capacity Improvements

Location	Estimated Cost to City ($)	Recommended Improvement	Recommended Year of Improvement
WFRC LRP Projects			
Fort Union Blvd – 3000 East to Wasatch Blvd	$250,000 ($2.5 million)	Widening to four lanes	2012
Wasatch Blvd - Fort Union Blvd to Little Cottonwood Canyon	$0 ($2.5 million)	Widening to four lanes	2015
2000 East – Bengal Blvd to Creek Rd	$300,000 ($3.0 million)	Widening to six lanes	2025
For WFRC projects, a cost to the City is shown with total project cost in parentheses.			
City Projects			
Fort Union Blvd/2000 East	$1.2 million	Additional Left Turn each direction	2010
Fort Union Blvd/1300 East	$900,000	Additional Left Turn each direction	2015
Fort Union Blvd/1300 East	$800,000	Additional Through Lane on Ft. Union	2020
Fort Union Blvd/Union Park Avenue	$900,000	Additional Left Turn NB	2020

Additional capacity improvements that may be needed in the future as development occurs are shown in Table 2.5. These are anticipated to be accomplished by developers and are not City capital projects. However, the City's participation in these projects is difficult to determine, so estimated potential costs to the City are included for planning purposes. The descriptions of these possible projects are as follows:

- *Fort Union Blvd/Park Centre Drive* – This project would entail the re-alignment of Park Centre Drive so that it intersects Fort Union Blvd approximately 150-200 feet further west from their current intersection. The project would be developer funded except for possibly intersection costs which may be funded by the City.
- *2300 E/2325 E @ Bengal Blvd* - In the future, as development demand occurs near this offset intersection, considerations should be made to re-align and combine the offset legs into a single intersection as a part of development improvements.
- *Oak Creek Dr/Willow Creek Dr @ Creek Road* - In the future, as development occurs near this offset intersection, considerations should be made to re-align and combine the offset legs into a single intersection as a part of development improvements.

Table 2.5. Other Non-Capital Capacity Improvements

Location	Estimated Cost to City	Recommended Improvement	Recommended Year of Improvement
Fort Union Blvd / Park Centre Drive	$320,000	Re-align Park Centre Dr and relocate intersection	2010-2015
2300 E/2325 E @ Bengal Blvd	$250,000	Combine offset intersections and re-align road segments	2015-2020
Oak Creek / Willow Creek Dr @ Creek Rd	$200,000	Combine offset intersections and re-align road segments	2020-2025

Figure 2.2. Traffic Capacity Project Map

Section 3 - Traffic Signals

Properly designed and maintained intersections are integral to providing a safe and effective transportation system. A key aspect of intersections is the traffic control devices that are in place. Traffic control devices affect not only vehicular traffic, but also pedestrian traffic. This section will discuss the current condition of traffic signals, pedestrian signals, and pedestrian facilities at the city-owned signalized intersections. A map of the traffic signal maintenance needs by year is exhibited in Figure 3.2.

Signal and Pedestrian Heads

The majority of the signal heads at the intersections contain incandescent bulbs. Very few of these heads contain Light Emitting Diode (LED) type illumination. The long life, high intensity, and lower power consumption make LED's a desirable alternative. A few of the signal heads already have LED's installed, but only in the red indicators. Some of the signal heads are in disrepair. The majority of the signal heads are painted black or green in color as depicted in Figure 3.1. These colors make the signal heads harder to see. Yellow colored heads are more visible to the driver. The paint is peeling on the older heads and in some cases has weathered down to the bare metal. Most of the signal heads don't have back plates installed. Back plates make the signal heads more visible and provide a contrasting view of the signal faces.

Figure 3.1. Union Park and 1300 E. – signal heads without back plates and painted black

The pedestrian heads are in similar condition. Most contain incandescent lights instead of LED's. The paint is peeling on most and some have weathered to bare metal. There are a few heads that don't illuminate well. The face of the device is cracked allowing light to bypass the symbol, which results in a faint or non-existent symbol. A couple of the heads are the older standard with the words "walk" and "don't walk" displayed instead of the accepted "hand" and "man" symbols. As shown in Figure 3.3.

Figure 3.2. Traffic Signal Map

Figure 3.3. Fort Union and Union Park- pedestrian heads

Pedestrian Facilities

Most traffic signal locations have some type of ADA ramp installed. The installed ramps appear not to meet current standards. Very few have the required truncated dome sections and most appear not to meet the width and slope requirements. Some locations have ramps in poor locations for the pedestrian movements. The crosswalks are faded in most locations with some locations lacking the required crosswalks and pedestrian heads as shown in Figures 3.4 and 3.5.

Figure 3.4. Bengal Blvd. and 2300 E.-poorly painted crosswalk near a school

Figure 3.5. Union Park and 1300 E. – No ADA ramps

Intersection Geometry Issues

The intersection of 6765 S. (La Cresta) 2000 E. (Highland Dr.) has a frontage road parallel to Highland Drive on the west side (Figure 3.6) which is offset by about 10'. This configuration creates safety issues on this leg of the intersection. The frontage road's proximity to the intersection causes some delay and requires drivers to be very aware of all of the vehicle movements taking place. North bound left turning vehicles have to watch for vehicles turning onto and off the frontage road while watching and yielding to south bound thru traffic while making a turn.

Two alternatives to the existing condition were devised to increase safety and mobility at the intersection. The first alternative would create a signalized intersection at the intersection of La Cresta and Highland Drive with full movement. For the intersection of La Cresta with the Frontage Road, a barrier would be placed along the centerline of La Cresta to prevent through movements on the Frontage Road and left turns at the intersection. Only right turns would be allowed in and out of the Frontage Road. The second alternative would close the Frontage Road on both sides of La Cresta and not allow any access from the Frontage Road to La Cresta. Two new right in/right out accesses would be added along Highland Drive (with access to the Frontage Road) as part of this alternative. These accesses would be located at about 6850 South and at about 6675 South. The first of these two alternatives is recommended. The estimated cost of reconfiguring this intersection ranges from $250,000 to $500,000 depending on the design chosen. These alternatives should only be pursued if zoning in the area changes to a more aggressive land use in the future.

Figure 3.6. 6765 S. (La Cresta) 2000 E. (Highland Dr.)

Recommendations

The improvements for each of the intersections have been divided into immediate (2006), short term (2007-2009), and other (2010). Immediate improvements represent those intersections with safety concerns. These intersections have signals that need bulb updates to LED type illumination that can receive matching funds from Utah Power. Short term improvements are represented by intersections that have pedestrian facilities that need to be adjusted to meet current standards and intersections without LED type illumination in the pedestrian heads. Other improvements are represented by intersections that need to be reconfigured to accommodate traffic growth.

The incandescent bulbs in both the signal heads and the pedestrian heads should be replaced with LED type illumination. They are more visible, require less maintenance and consume less power. Place back-plates on the signal heads and repaint dark colored heads to a color, such as yellow, to increase the visibility of the signalized intersections. An example of a well configured intersection is shown in Figure 3.7. In some cases replacing the heads with new ones will be more cost effective.

Figure 3.7. Highland Dr. and Bengal Blvd. – Yellow signal heads with LED's and backplates

Replace and reconfigure pedestrian ramps at all intersections where ADA standards are not met. This work will require concrete removal and replacement and may require additional pedestrian heads and pedestrian type poles. The intersection of 7000 S.(Fort Union Blvd) 1090 E.(Union Park Blvd) is very poorly configured and should be considered a top priority. The pedestrian traffic in this part of town is due to the concentration of commercial businesses. Providing proper pedestrian facilities in this area should be a priority. Figure 3.8 and Figure 3.9 exhibit characteristics of properly designed pedestrian ramps.

Figure 3.8. Highland Drive and Bengal Blvd. – pedestrian ramp with truncated dome

Figure 3.9. Highland Drive and Bengal Blvd. – Well configured pedestrian ramp

Estimated costs for recommended traffic signal improvements at each intersection are exhibited in Table 3.1. These projects were prioritized first by the year that the project needs to occur and secondly by the ADT of the highest volume road using the intersection. Further prioritization was accomplished by moving all LED replacements of existing incandescent bulbs for traffic signal and pedestrian signal heads to the 2006 improvement year to take advantage of Utah Power matching funds that are available for LED installations for that time period. The next highest priority was improving the pedestrian facilities at the signalized intersections. These improvements include pedestrian ramps, pedestrian signal heads, etc and are scheduled to be accomplished from 2007-2009. All other traffic signal improvements including replacing signal heads are scheduled to be accomplished in 2010.

Table 3.1. Recommended Traffic Signal Improvements

			Year 2006	Year 2007	Year 2008	Year 2009	Year 2010
			Traffic & Pedestrian Signal LED Replacement	*Pedestrian Facilities (Ramps, Signal Heads, etc)*	*Pedestrian Facilities (Ramps, Signal Heads, etc)*	*Pedestrian Facilities (Ramps, Signal Heads, etc)*	*Other Traffic Signal Needs*
STREET	**LOCATION**	**ADT**	**COST ($)**	**COST ($)**	**COST ($)**	**COST ($)**	**COST ($)**
Union Park Ave	1300 E.	56,300	$ 12,359		$ 25,920		$ 14,918
Fort Union Blvd	1300 E.	56,300	$ 5,103	$ 18,900			$ 13,770
Fort Union Blvd	Union Park Ave	56,300	$ 12,832	$ 160,920			$ 17,213
Fort Union Blvd	Highland Drive	51,200	$ 11,651		$ 11,745		$ 11,475
Highland Drive	La Cresta (6765 S)	51,200	$ 6,696		$ 2,633		$ 11,475
1300 E	7180 S	44,100	$ 9,970		$ 18,900		
Union Park Ave	Creek Rd	44,100	$ 15,194		$ 25,920		
Highland Drive	7200 S.	34,800	$ 11,178		$ 7,020		$ 9,180
Highland Drive	Bengal Blvd	34,800	$ 7,088				
Park Centre Drive	1300 E.	30,900	$ 9,734		$ 18,900		
Fort Union Blvd	2200 E.	30,700	$ 2,552		$ 14,175		$ 6,885
Fort Union Blvd	2300 E.	30,700	$ 4,158		$ 18,900		$ 9,180
Highland Drive	7780 S.	30,300	$ 8,080		$ 18,900		
Highland Drive	Creek Rd	30,300	$ 12,427			$ 18,900	
Fort Union Blvd	1700 E.	28,800	$ 8,384			$ 24,165	$ 6,885
Fort Union Blvd	Park Centre Drive	26,900	$ 10,078			$ 17,685	
Fort Union Blvd	2700 E.	16,700	$ 7,749			$ 18,900	$ 3,443
Fort Union Blvd	3000 E.	16,700	$ 5,859			$ 18,900	
Bengal Blvd	2300 E.	12,600	$ 2,552			$ 14,175	$ 6,885
Bengal Blvd	2325 E.	12,600	$ 2,552			$ 14,175	$ 6,885
3000 East	6450 S.	12,100	$ 8,411			$ 14,175	
3000 East	6580 S.	12,100	$ 4,253				
Bengal Blvd	2600 E.	8,100	$ 5,825			$ 22,410	$ 5,738
			$ 184,680	**$ 179,820**	**$ 163,013**	**$ 163,485**	**$ 123,930**
			2006 TOTAL	**2007 TOTAL**	**2008 TOTAL**	**2009 TOTAL**	**2010 TOTAL**

Section 4 - Traffic Calming

As Cottonwood Heights examines its infrastructure needs as a newly formed city, one issue that has been raised by citizens in various parts of the city is the need for traffic calming. Reasons for the perceived need range from observed excessive speed, excessive traffic using local residential streets, pedestrian safety, and unwanted traffic. In addressing this issue, several "sample" locations that had been reported by citizens of the City as having a traffic calming need were observed and analyzed to determine appropriate strategies to address this need.

Traffic calming is typically implemented only on the lower volume roads and streets, including local streets and minor collectors. Traffic calming methodologies are seldom (and cautiously) used on major collectors and never used on arterial streets due to the relatively higher traffic volumes, speeds and intended purpose of this type of facility.

Traffic Calming Methods

The following traffic calming measures can be applied to a variety of traffic problems; however, their main purpose is to reduce vehicular speeds and traffic volumes. Secondary benefits derived include encouraging community interaction and promoting safety through increased usage of alternative transportation modes (e.g. walking, running, and bicycling).

Street Design Measures

Traffic calming measures related to street design include measures that physically alter the vertical or horizontal alignment of the roadway such as speed humps, traffic circles, chicanes and neck-downs or chokers. A brief explanation of some of these measures is contained in the following paragraphs.

Traffic Circles

This traffic calming device is a circular island that is generally placed at intersections around which traffic flows in a counter- clockwise direction. This device has the potential to reduce speed and accident severity and improve capacity. Some of the negative aspects of traffic circles are driver unfamiliarity (yielding to the vehicle on the left), and vehicles may encroach on pedestrian crosswalks and bicycle travel lanes. Cost: $3,500-$15,000.

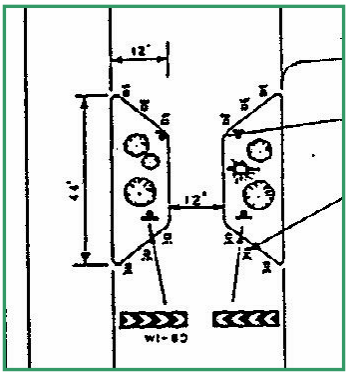
Chicanes

A chicane consists of curb extensions that are placed to form an S-shaped path for vehicular traffic to follow. This traffic calming measure may help to reduce vehicle speed, shorten pedestrian crossing distances, and protect parking bays; however, they tend to have higher maintenance costs due to landscaping, may be a factor

in head-on collisions, and can potentially contribute to drainage problems. Cost: $5,000-$15,000 per set.

Neckdowns or Chokers

The purpose of both neckdowns and chokers is to narrow the roadway. Neckdowns, however, are generally implemented at intersections while chokers are utilized at midblock locations. A main application of this measure is to improve pedestrian safety by decreasing the street crossing distance. As neckdowns are typically applied at intersections, they tend to reduce the turning speed of vehicles at these locations. Landscaping associated with neckdowns (chokers) may increase maintenance costs, and adjustments to the drainage system may be required. Cost: $7,000-$10,000 per pair.



Speed Humps

Speed humps are vertical measures that are generally used to reduce vehicular speed and cut-through traffic; they are raised sections that are usually parabolic in shape. While they do tend to reduce speed and cut-through traffic, they also tend to increase emergency vehicle response time and noise. Cost: $2,000-$3,000.

Route Modification

In contrast to the traditional traffic calming methods, which attempt to modify driver behavior, the traffic calming measures in this section attempt to alter the routes available for traffic or traffic flow. Although route modification and other traffic calming measures share the common goal of improving the quality of life by preventing cut through traffic, route modification is an attempt to change traffic routing or traffic flow on the street network while more conventional traffic calming measures attempt to alter driver behavior.

Full Street Closures

A full street closure completely closes the street to through traffic and is primarily used to reduce cut-through traffic. A variety of measures could be used to create a full street closure such as islands, walls, gates, or side-by-side bollards. Some of the main concerns associated with street closures are an increase in emergency response time, loss of connectivity between areas of the city, a decrease in the capacity of the roadway, and the diversion of traffic to other routes.

Half Closures

This measure is also used to reduce traffic volumes by blocking travel in one direction on streets that generally permit travel in both directions. Half closures may be implemented at both intersections and midblock locations. These closures, however, tend to be less effective than full closures due to the fact that motorists are more likely to violate the closure since it may extend only a short distance.

Diagonal Diverters and Median Barriers

Diagonal diverters are placed across an intersection in order to block the through movements, and median barriers are positioned at an intersection to impede the through movement from the cross street. By impeding the through movements, these routes become less attractive, and therefore, the traffic volume on these roads may be reduced. The main concern with these types of traffic calming measures is the potential for increased volumes on parallel streets.

Recommendations

As a City, Cottonwood Heights needs to establish a policy regarding traffic calming measures including a procedure to determine how, when, and where they are to be implemented and from where the funding for the measures will come. In areas where traffic calming is desired by residents, neighborhood meetings should be used to determine implementation factors and parameters. An annual dollar amount needs to be budgeted by the City to be applied to whichever traffic calming projects qualify, in whole or in part, for funding by the City.

Section 5 - Truck Routes

Along with the need to transport goods from place to place throughout the City comes the necessity that it is done so in a manner that takes into account the safety and well-being of the residents and others using the roadways and pedestrian facilities in the City. As per the Cottonwood Heights *Code of Ordinances* 11.08.250, truck routes have been defined and are as listed below:

City Roads

- Union Park Avenue
- Fort Union Blvd
- Highland Drive (2000 East)
- 1300 East
- Union Park Avenue
- 3000 East.

State Roads

- Wasatch Drive
- I-215 (along the northern City limit).

The routes listed above are exhibited in Figure 5.1 "Truck Routes Map". Each of these roads has sufficient capacity to handle truck traffic and are in areas that are generally away from residential areas. Furthermore, these roads all have posted speed limits of at least 35 mph.

There is not presently a known issue with excessive truck usage of residential streets. However, if, in the future, trucks cutting through neighborhoods become an issue, then the routes listed above and shown in the figure on the following page should be posted as truck routes as set forth in the ordinance.

Figure 5.1. Truck Routes Map

Section 6 - Sidewalks and Lighting

The sidewalks and street lighting in the City were inventoried and assessed to determine their existing physical condition and deficiencies in their placements. Each item was prioritized by the need to either repair or replace them. In determining sidewalk needs, the "Safe Walking" plans—provided by and used by the local schools—were consulted to ensure that those areas where school children would need pedestrian facilities would be prioritized higher. In areas where transportation of school children to/from school has recently or will change from bussing to other means, a determination will be made as to the immediate pedestrian facility upgrades that may be needed to accommodate possible increases in pedestrian travel.

Sidewalk Priorities

After each sidewalk, curb and gutter was assessed, each segment's condition was assessed to determine if it posed a potential safety hazard or other problem of immediate concern. These are areas that have major problems and/or damage to sidewalk and/or curb and gutter including severely sunken curb and gutter making proper drainage impossible and/or raised sections of sidewalk (ADA impassible). These segments were identified and included as "Immediate" repair needs totaling $377,733 and are budgeted, half each year, for years 2006 and 2007.

The remaining areas of the City not covered in the "Immediate" repair needs, including the "Safe Walking" needs, are included in the sidewalk database located in the Appendix along with estimated costs for those repairs. This database can be referenced in determining potential future projects to which the City may supply funding.

Safe Walking Plan

In accordance with guidance given by the *Manual on Uniform Traffic Control Devices (MUTCD): Part 7, Traffic Controls for School Areas"*, a "safe walking" school route plan needs to be developed for each school ranging from elementary to high school in order to "develop uniformity in the use of school area traffic controls and to serve as the basis for a school traffic control plan for each school" (MUTCD, 2003). The Cottonwood Heights Comprehensive Plan has identified routes for each of the elementary schools, but not for the middle school or high school. The following guidance from the MUTCD is given for developing a school traffic control plan for each school:

1. The school route plan, developed in a systematic manner by the school, law enforcement, and traffic officials responsible for school pedestrian safety, should consist of a map showing streets, the school, existing traffic controls, established school walk routes, and established school crossings.
2. The type(s) of school area traffic control devices used, either warning or regulatory, should be related to the volume and speed of vehicular traffic, street width, and the number and age of the students using the crossing.
3. School area traffic control devices should be included in a school traffic control plan.
4. School walk routes should be planned to utilize existing traffic controls.
5. The following factors should be considered when determining whether or not to cause children to walk a further distance to use an existing traffic control:
    a. Availability of adequate sidewalks or pedestrian facilities to the location with existing control,
    b. The number of students using the crossing,

c. Ages of the students using the crossing, and
d. The total extra walking distance.

Sidewalks in need of repair that are included within the schools' safe walking plans should be considered for potential funding ahead of sidewalks in other areas. In order to better provide for the pedestrian needs of the schools, a school traffic control plan needs to be developed for each school. With those traffic control plans in place, a better assessment and allocation of potential funds for pedestrian facility improvements can be made. It is recommended that each school have a traffic control plan in place by the end of 2006 so that appropriate adjustments can be made to meet the needs of the schools.

Transit Considerations

There are several existing Utah Transit Authority (UTA) bus routes and stops in Cottonwood Heights. Normal service routes exist for sections of the following roads in the City:

- Ft. Union Blvd,
- Union Park Avenue,
- Creek Road,
- Highland Drive (2000 East),
- 2300 East,
- 2700 East,
- Bengal Blvd,
- 3500 East,
- Golden Hills Avenue,
- Kings Hill Drive,
- 3000 East, and
- Wasatch Blvd.

There has been discussion as to what the proper facilities at bus stops should be: whether benches or bus shelters should be installed and if those should be paid for by the City or an outside entity. If the City were to pay for these, the cost would be approximately $2,500 per bench and $10,000 per bus shelter. If, for example, an advertising company paid for the installation and then was allowed to put advertisements on the bench or bus shelter, then the cost to the City would be nothing. These could be installed as needed and as funding becomes available.

Terminology

For Sidewalks, Curb and Gutter

Major Distress: Denotes that the segment has areas that have major problems or damage with the identified feature. Problems and damage includes severe dips and rises in the curb and gutter that prevents proper drainage and subsequently possible sub-surface damage to the roadway, severe dips and rises in sidewalks that create a tripping hazard and do not allow for ADA access. It also includes sections of spalling that prevent ADA accessibility. Figure 6.1 shows examples of major problems.

Figure 6.1. Major problems with Curb and Gutter

Moderate Distress: Denotes that the segment has areas with moderate damage or problems with the identified feature. Problems and damage are moderate in nature and are questionable concerning ADA accessibility issues. Figure 6.2 exhibits examples of some moderate issues.

Figure 6.2. Moderate problem with Curb and Gutter - Moderate problem with Sidewalk

None / % None: Identifies that the segment or a percentage of the segment is missing the indicated feature.

Rolled Curb / % Rolled Curb: Identifies that the segment or a percentage of the segment has rolled curb.

Rolled Curb in Cul-de-sac: Identifies the Cul-de-sac's that have vertical curb and gutter at the entrance, but have rolled curb in the turn around section of the Cul-de-sac.

Minor Distress: Denotes that the segment has areas that have minor damage or problems. These minor problems/damage include small lifts in sidewalk that are still ADA accessible, minor drainage issues, and small rises in the curb and gutter.

Locations of "Immediate" and all other sidewalk repair needs are exhibited in Figure 6.3 "Sidewalk Repairs Map".

Figure 6.4 exhibits where sidewalks exist, either complete "existing" sidewalks along both sides of the road or "partial" sidewalks, meaning, intermittent sidewalks or sidewalk along only one side of the road or both.

Figure 6.5 shows where non-immediate improvement needs exist for the following conditions: currently only sidewalk exists, currently only curb exists, both sidewalk and curb currently exist, and where no improvements are needed. The existing "Safe Walking" routes are also exhibited in this figure.

A detailed breakdown of sidewalk conditions for all streets can be found in the Appendix. All anticipated sidewalk and curb and gutter repair costs are summarized in Table 6.1. Only immediate repair needs and the recommended annual budget are identified in the table. The remaining work can be accomplished as property owners develop their own priorities.

Table 6.1. Recommended Sidewalk Improvements

Type	Estimated Cost to City ($)
Immediate Repairs	$377,733
Annual Repair Budget (2008-2030 at $50,000/year)	$1,150,000

It is the expressed policy of Cottonwood Heights to not construct new sidewalks in all areas of the City. In areas where safety concerns or other pertinent factors are evident, the City may consider partial or full funding of sidewalk improvements. The City is currently in the process of creating a policy regarding sidewalk installation and repair, cost sharing considerations, and parameters for improvements. For more detailed information on sidewalks along with the plan to bring the City's sidewalks and pedestrian facilities into compliance with the American's with Disabilities Act (ADA) requirements, see the City's sidewalk policy. It is recommended that, after the immediate needs are resolved, an annual amount of $50,000 be budgeted for sidewalk projects. If it is desired by the City to accelerate the completion of partial sidewalks; installation of new sidewalks; installation of street lighting; or improvements to street lighting, sidewalks, or curb and gutter; a viable way of accomplishing this is to form a special improvement district (SID) either at the neighborhood level or the City level.

Figure 6.3. Sidewalk Repairs Map

Figure 6.4. Sidewalk Location Map

Figure 6.5. Sidewalk and Curb Improvement Needs

For Street Lighting

None: there is no lighting along the segment.

Luminaire – Good: The lighting on the segment is provided by luminaires and the general condition of the lights appears to be acceptable. Figure 6.6 exhibits typical luminaires found along main streets in Cottonwood Heights and Figure 6.7 shows typical luminaires found in neighborhoods.

Figure 6.6. Examples of Luminaires along main streets

Figure 6.7. Example of a Luminaire found in a neighborhood

Luminaire – Broken: Denotes the segment has broken or damaged light(s) (see Figure 6.8 for example).

Figure 6.8. Example of Broken Luminaire at Excelsius Circle

Lamps – Good: The lighting on the segment is provided by lamp posts and the general condition of the lamp posts appears to be acceptable. Figure 6.9 exhibits a typical lamp post.

Figure 6.10 exhibits the locations of existing street lighting in the City by type (lamp or luminaire). With a few notable exceptions, such as Meadow Drive, most existing street lights were found to be in good condition.

Figure 6.9. Typical Lamp Post

Those locations of non-existent street lighting are also shown in Figure 6.10. Should a neighborhood desire to have street lighting installed, the cost for street lighting per foot of property frontage is generally estimated at $32 per foot. It is the policy of the City that street lighting improvements will be "citizen driven" and will most likely require monetary participation from residents in the vicinity where street lighting improvements are desired. The City has offered to pay for the ongoing electricity consumption for the street lighting once installed.

For ADA-Pedestrian Ramps

More complete ADA-Pedestrian Ramp data is provided in the Appendix and conditions are defined as follows:

None: Indicates there are no pedestrian ramps in the segment. This is generally due to no sidewalks and/or curb and gutter existing along the segment.

Ok: Indicates that the segment contains apparent pedestrian access ramps. Further inspection and a replacement plan will need to be performed by the city.

None @...: Indicates that there are no pedestrian access ramps located at the specified intersection or segment end.

The City should proceed with a detailed plan for the systematic installation of ADA ramps.

Budgetary Considerations

For both new sidewalks and street lighting, citizens should consider forming an SID if they want their project to be completed in the near future. Residents should also understand that any sidewalk or street lighting improvements in their area may require their monetary participation.

Figure 6.10. Street Lighting Map

Section 7 - Bridges

This section contains a summary of each city-owned bridge based on field evaluations. The purpose of this section is to provide a description of each city-owned bridge and to identify it with its associated improvement year and cost. Figure 7.1 "Bridges Map" exhibits the locations of the bridges on a city-wide scale. Table 7.1 details the span lengths, widths, and estimated costs for each bridge. Of particular interest is Bridge B1. This bridge is in the most urgent need of replacement of the 13 bridges in the City. However, it is not owned by the City, but is on a private road. The owner or homeowners association responsible for its upkeep should be notified of the need to replace it by the year 2007.

In each individual summary in this report contains the following bridge information: 1) the location, 2) the rehabilitation year/cost, 3) the replacement year/cost, 4) and a brief description of the bridge. It is recommended that the city inspect these bridges every 5 years.

Terminology

Rehabilitation – describes the work for repairing/sealing cracks and delaminated areas on the existing bridge decks, wingwalls, headwalls, parapets, and abutments. It also describes work for patching potholes on the deck and resurfacing the disturbed roadway. Rehabilitation also includes cleaning and repainting of structural and replacing defected bridge components. *Rehab.* is short for *rehabilitation.*

Rehabilitation Year/Cost – describes the recommended year and cost for rehabilitating a structure. Costs are based on the year 2005.

Replacement – describes the work for replacing an old bridge with a new one.

Replacement Year/Cost – describes the recommended year and cost for replacing a structure based on an estimated life of a structure. Typically, a bridge's life is between 40 – 60 years. Costs are based on the year 2005.

Structural Grade – describes the general structural condition of the bridge. The designated grades in this report are on a scale from 1 to 5 with 1 being poor, 3 being average, and 5 being excellent.

Figure 7.1. Map of Bridges

Table 7.1. Bridge Dimensions

Location			Quantity		
Bridge No.	Street	Address/Crossing	Span	Width	Deck Area
B1*	Royal Ln.	2408 East/Little Cottonwood Creek	21 ft.	25 ft.	525 SF
B2	Creek Rd.	2653 East/Little Cottonwood Creek	30 ft.	60 ft.	1800 SF
B3	Union Park Ave.	6925 South/Little Cottonwood Creek	40 ft.	100 ft.	4000 SF
B4	1495 East	6901 South/East Canal	5 ft.	55 ft.	275 SF
B5	Greenfield Way	6642 South/East Canal	17 ft.	50 ft.	850 SF
B6	Fort Union Blvd	1440 East/East Canal	20 ft.	120 ft.	2400 SF
B7	Fort Union Blvd	1166 East/Little Cottonwood Creek	30 ft.	120 ft.	3600 SF
B8	Union Park Ave.	7235 South/Little Cottonwood Creek	32 ft.	100 ft.	3200 SF
B9	Oak Creek Drive	8100 South/Little Cottonwood Creek	25 ft.	50 ft.	1250 SF
B10	Highland Drive	7900 South/Little Cottonwood Creek	26 ft.	50 ft.	1300 SF
B11	Farm Brook Way	8070 South/Union East Jordan Ditch	3 ft.	50 ft.	150 SF
B12	Canyon Creek	6880 South/Big Cottonwood Creek	27 ft.	60 ft.	1620 SF
B13	3000 East	6515 South/Big Cottonwood Creek	26 ft.	100 ft.	2600 SF
* Private bridge that is not the City's responsibility.					

Bridge Summaries

Structure B1

Location: Royal Lane 2408 East
Rehabilitation Year/Cost: See Replacement Year/Cost
Replacement Year/Cost: 2007 - $70,875 (private)

This cast-in-place (CIP) bridge is along a local road with low traffic volume and achieves the structural condition grade of slightly less than "3". The existing walls, headwalls, deck, and wingwalls are spalling. The rusted railing alongside the bridge is not traffic resistant. Only one vehicle can pass over this bridge at one time – the bridge is significantly narrow. This is a privately owned bridge. The replacement cost for this bridge is given as information only and does not indicate a responsibility of the City to pay for it.

Structure B2

Location: Creek Rd. 2653 East
Rehabilitation Year/Cost: 2009 - $75,600
Replacement Year/Cost: 2020 – $243,000

This cast-in-place (CIP) Concrete Box Culvert is along a local road with medium traffic volume and achieves the structural grade of "3." The existing base slab is disjointed. The deck underneath is spalling. No bolts are in the parapet guardrail connections. The rusted railing alongside the structure needs to be painted. The costs of the rehabilitation and/or replacement costs for this bridge may be shared with Salt Lake County.

Structure B3

Location: Union Park Ave. 6925 So.
Rehabilitation Year/Cost: 2011 - $168,000 **
Replacement Year/Cost: 2025 – $540,000 **

This two-cell cast-in-place (CIP) Concrete Box Culvert is along a collector street with high traffic volume and achieves the structural grade of "3." The existing base slab is disjointed and rebar is exposed. The wingwalls are cracking. The costs of the rehabilitation and/or replacement costs for this bridge may be shared with Midvale City.

Structure B4

Location: 1495 East 6901 South
Rehabilitation Year/Cost: 2013 - $11,550
Replacement Year/Cost: 2030 – $37,125

This corrugated metal pipe (CMP) culvert is along a local road with low traffic volume and achieves the structural grade of "3." The parapet and deck are spalling and there is a small area of exposed reinforcing steel along the bottom edge of the deck.

Structure B5

Location: Greenfield Way 6642 South
Rehabilitation Year/Cost: 2015 - $35,700
Replacement Year/Cost: 2030 – $114,750

This cast-in-place (CIP) concrete box culvert is along a local road with low traffic volume and achieves the structural grade of "3." The railing is rusting. The integrity of the fence jeopardizes the pedestrian safety around the bank of the canal.

Structure B6

Location: Fort Union Blvd. 1440 East
Rehabilitation Year/Cost: 2015 - $100,800
Replacement Year/Cost: 2030 – $324,000

This cast-in-place (CIP) Concrete Box Culvert is along a collector street with high traffic volume and achieves the structural grade of "3." Because of the constant irrigation water flow, structural judgment is based solely on what is visible.

Structure B7

Location: Fort Union Blvd. 1166 East
Rehabilitation Year/Cost: 2016 - $151,200
Replacement Year/Cost: 2030 – $486,000

This cast-in-place (CIP) Concrete Box Culvert is along a collector street with high traffic volume and achieves the structural grade of "3." Portions of the headwall are spalling and the chain link fence is damaged. Southside has decorative headwall.

Structure B8

Location: Union Park Ave. 7235 So.
Rehabilitation Year/Cost: 2017 - $134,000
Replacement Year/Cost: 2035 – $432,000

This cast-in-place (CIP) concrete deck on abutment walls is along a collector street with high traffic volume and achieves the structural grade of "4." The railing is rusting. The costs of the rehabilitation and/or replacement costs for this bridge may be shared with Midvale City.

Structure B9

Location: Oak Creek Drive 8100 South
Rehabilitation Year/Cost: 2018 - $52,500 **
Replacement Year/Cost: 2040 – $168,750 **

This pre-cast concrete box culvert is along a local road with low traffic volume and achieves the structural grade of "4."

Structure B10

Location: Highland Drive 7900 South
Rehabilitation Year/Cost: 2019 - $54,600
Replacement Year/Cost: 2042 – $175,500

This pre-cast concrete arched box culvert is along a collector street with high traffic volume and achieves the structural grade of "4."

Structure B11

Location: Farmbrook Way / 8070 South
Rehabilitation Year/Cost: 2020 - $6,300
Replacement Year/Cost: 2045 – $20,250

This corrugated metal pipe (CMP) culvert is along a local road with low traffic volume and achieves the structural grade of "4."

Structure B12

Location: Big Cottonwood Cyn. / 6880 So.
Rehabilitation Year/Cost: 2021 - $68,040
Replacement Year/Cost: 2045 – $218,700

This pre-cast concrete box culvert is along a local road with medium traffic volume and achieves the structural grade of "4." The parapet is missing a small portion of the handrail.

Structure B13

Location: 3000 East 6515 South
Rehabilitation Year/Cost: 2022 - $109,200
Replacement Year/Cost: 2045 – $351,000

This pre-cast concrete box culvert is along a local road with medium traffic volume and achieves the structural grade of "4." The handrails are rusted and there is graffiti on the walls.

Section 8 - Pavement Maintenance and Reconstruction

The evaluation objective of this section was to determine if the Salt Lake County road inventory ratings for the City of Cottonwood Heights represented a reasonable condition of the road system. This evaluation would allow for treatment strategies to be identified for respective ratings. The pavement in the City was last inventoried in 2002.

In order to accomplish this, a correlation between the present roadway condition and the 2002 roadway condition needed to be developed. This was done by selecting a sample population of roads and rating them by a visual inspection based on criteria such as severity and type of cracking, drainage, pavement roughness, potholes, an so forth. The data was evaluated and ranked using a PCI (Pavement Condition Index) number. A PCI number—or OCI (Observed Condition Index) as used by the County—was assigned to the sample population so that the 2002 rating could be compared to the present day road conditions. By developing a correlation between the old and present data and assuming that roads with similar characteristics and traffic volumes age similarly, all of the road segments were able to be adjusted to present day values. While developing a correlation, the natural deterioration of pavement must be recognized. As pavement ages its deterioration accelerates. Therefore, the sample population had road segments from select PCI ranges that were evaluated in the field. The PCI ranges were developed to match the recommended treatments. The assessment criteria used is shown in Table 8.1.

Table 8.1. Pavement Assessment Criteria

OCI	Treatment Strategy	Cost per Square Yard ($)
90-100	Do Nothing	$0.00
75-90	Slurry Seal	$1.25
60-75	Single Chip Seal	$2.25
50-60	Thin Hot Mix Overlay (< 2”)	$24.00
30-50	Rotomill and Thick Overlay (3”)	$30.00
< 30	Reconstruction	$88.00

Once the OCI rating was adjusted to Year 2005 conditions, a corresponding treatment was assigned to the new OCI rating for each segment. The final procedure was to go back to the field and evaluate the suggested treatment. Road segments were assigned treatment strategies based on this new OCI rating.

Pavement maintenance should be accomplished on a five to seven year rotation. Figures 8.1 and 8.2 depict the recommended pavement treatment and year of repair, respectively. Detailed condition ratings, recommended treatments, and costs for each road segment can be found in the Appendix. The overall five year recommended pavement maintenance program is summarized in Table 8.2. An average annual budget of $813,000 is needed to meet the demands of a five year cycle.

Figure 8.1. Pavement Maintenance By Treatment Type

Figure 8.2. Pavement Maintenance By Year

Table 8.2. Pavement Maintenance Program Summary

Pavement Maintenance Priority Year	Recommended Budget
2006	$1,466,478 **
2007	$842,867
2008	$566,984
2009	$584,844
2010	$665,589
** This amount does not include the $502,459 that would be Midvale City's 50% share of the estimated total cost of maintenance to Union Park Avenue.	

Section 9 – Additional Recommended Capital Projects

Table 9.1 exhibits some additional projects that have been identified as already planned for or otherwise needed for the benefit of the City.

Table 9.1. Additional Projects Summary

Project	Recommended Year	Recommended Budget
In-depth Signal Coordination Plan for Fort Union Blvd	**2006**	**$140,000**
Intersection of Deer Creek Rd and Deer Creek Cir. – Reconstruction	**2006**	**$70,000**
Danish Road Safety Study & Improvements – Creek Road to Wasatch Blvd (Phase I)	**2007**	**$225,000**
City-wide Access Management Plan	**2007**	**$35,000**
Intersection of Wasatch Rd and Little Cottonwood Rd – Traffic Study (Phase I)	**2008**	**$35,000**
Intersection of Wasatch Rd and Little Cottonwood Rd – Re-design and Reconstruction (Phase II)	**2010**	**$315,000**
Street and Regulatory Sign Replacement	**2006-2016**	**$25,000 per year ($250,000 total)**
Update Capital Facilities Plan	**2010**	**$35,000**

The signal coordination plan for Fort Union Blvd should include comprehensive intersection studies for each individual signalized intersection along the corridor. The result of this study should be an implemented, working timing and coordination plan for Fort Union Blvd that works in concert with the existing coordination plan that is operating on 2000 East (Highland Drive). This includes preliminary design of all necessary intersection and roadway improvements necessary to implement the plan. This does not include construction costs which may vary dramatically depending on the results of the study. The Danish Road safety study will determine future work that may need to be accomplished.

Street and regulatory signing in the city needs to be updated to current standards for visibility and reflectivity to meet the *Manual for Uniform Traffic Control Devices* (MUTCD) guidelines (MUTCD, Chapter 7). An annual budget of $25,000 for the next ten years should be budgeted.

The pavement management plan should be re-evaluated every three to five years. By 2010, the plan needs to be re-assessed to ensure that estimates and treatments are still valid.

Section 10 - Funding Opportunities

The City would hope to acquire funding to accomplish all of the transportation improvement projects that are needed in the future. Since internal funds are limited by the City's budget, external sources must be identified and pursued to obtain the amount of funds that will be needed. The following funding sources require advanced planning in order to achieve a high rate of success.

- **Transportation Impact Fee Assessment**
  - According to Utah Code Title 11 Chapter 34, Impact fees may be collected to pay for the construction of new or expanded capital facilities in relation to new development. Impact fees may not be used to pay for the operation or maintenance of existing capital facilities.
  - In Cottonwood Heights there are five areas of land identified by City staff that could eventually be developed. Analysis of potential traffic generation from these areas revealed that the additional trips generated from these developments will either pour onto city roads that have sufficient capacity or onto State owned roads. The changes required by the development of the five areas and their proportional responsibility to the overall traffic impact are minimal.
  - The process of imposing an impact fee can be costly and time consuming. Therefore, it is recommended that Cottonwood Heights should not pursue a roadway impact fee on new development at this time.
  - Cottonwood Heights should, however, work with developers to ensure that the roads, sidewalks, curbs and gutters installed in each of these developments are satisfactory.
  - Cottonwood Heights should also reconsider imposing an impact fee on developers in the event of a zoning change or annexation of developable land.

- **Congestion Mitigation/ Air Quality (CMAQ)**
  - This program gives federal-aid to projects which reduce traffic congestion and improve air quality in non-attainment areas. Example of CMAQ projects are single coordination, park and ride lots, ridesharing, bus services expansion, and alternative transportation modes, which include bicycle and pedestrian facilities.
  - Projects that increase capacity for single occupancy vehicles are not allowed.
  - Projects in the State Implementation Plan for clean air attainment should receive priority.
  - The federal share for CMAQ projects is 93 percent.
  - Wasatch Front Regional Council (WFRC), in September of each year, will send out a "Letter of Intent" to each city requesting concept reports for projects. These concept reports are due the middle of January.

- **Surface Transportation Program (STP)**
  - This program is a combination of former Federal Aid Urban, Hazard Elimination and Safety, and part of the Federal-Aid primary and secondary programs.
  - The funds may be spent on any road that is functionally classified as a collector or higher for urban street or a major collector or higher for rural areas.
  - Type of projects may range from rehabilitation to new construction.
  - The federal share for the STP projects is 93 percent.

  - Wasatch Front Regional Council, in September of each year, will send out a "Letter of Intent" to each city requesting concept reports for projects. These concept reports are due the middle of January.

- **Safety Sidewalk Funds**
  - Funds the construction of sidewalks on roads on the state system.
  - Money is distributed through a formula based partially on miles of state road in each UDOT Region.
  - Each city and county located in the region submits projects to the UDOT region office, which then prioritizes them based on certain criteria.
  - A statewide committee then makes the final project selection.

- **Bridge Replacement Program**
  - This program provides funds for the replacement of substandard bridges, both on and off federal-aid systems. Bridges must have a span of 20 feet in order to be eligible to receive these funds.
  - UDOT has evaluated all eligible bridges in the state and has given them a rating. They re-inventory the bridges about every two years.
  - All bridges with a rating of less then 50 are eligible to receive funding on a first-come, first-served basis.
  - The state commission has established a policy that 65 percent of these funds will be used for bridges on the state system with the remaining 35 percent being used for bridges under local jurisdiction.
  - The federal share for these projects is 80 percent.

- **Enhancement Non Motorized Trail Grants**
  - This program is known as the TEA-21 Recreational Trails Program.
  - Funds may be used to maintain and restore trails, develop trailside and trailhead facilities, acquire easements or land for trails, and to construct new trails. The Federal share for these projects is 80 percent. Applicants share is 20 percent and can be a match of in-kind services.
  - Applications are due the first part of January.
  - Letter of support from the UDOT Region Director, with which you belong, is required.
  - Environmental clearances may be required.
  - Additional "Letters of Support" are beneficial to your application and show additional endorsement for the project.
  - A Trails Master Plan must be available, and part of your transportation plan or general plan.

- **Utah Parks Non Motorized Trail Grants**
  - Federal and State money is available (in the past state money has been very limited).
  - Recreational Trails Program funds are available for motorized and non-motorized trail development and maintenance projects, educational programs to promote trail safety and trail related environmental protection projects. Project sponsors can be cities, counties, special service districts and state and federal agencies.

- 50 percent of total project costs come from applicant. This cost can be a combination of sponsor cash expenditures, in-kind services or value of volunteers and donations. At least 5 percent of the total project cost must come from non-federal sources if the project sponsor is a federal agency. Grant size limitation: No grants given for less than $10,000. Grants rarely given for more than $100,000.
- Contract period: 2 years.
- Environmental clearances required: After the sponsor signs the fiscal assistance contract and a state contract number is assigned to the project, the sponsor is required to obtain a series of environmental clearances before the project can begin. (Example: archeological, paleontological, threatened and endangered species, stream alteration permit, etc.)
- Disadvantaged Business Enterprise (DBE) requirements (49 CFR part 26): If a trail project sponsor subcontracts all or part of the project they need to follow DBE requirements, meet DBE goals, or document why they did not meet the goals.

- **Community Development Block Grants**
  - These funds can be used in a wide variety of activities directed toward neighborhood revitalization, economic development, and improved community facilities and services, including the construction or improvement of streets and highways.
  - The projects however, must be clearly demonstrate that all the projects principally benefit low to moderate income persons, aid in the elimination of slum and blight, or meet other urgent community health and safety needs.
  - Grant usually due before December 1st
  - The project must be listed on your capitol improvement list.

- **Federal Earmark Funds**
  - This form of funding is a formal appropriations request that is applied for through the Utah US Congress and Senate representatives. These funds are requested before March 15th and require continual contact with Senate and Representative Staffers.
  - Funds are appropriated to the city directly without the need for a formal grant application.
  - Wasatch Front Regional Council also puts together a list of projects for appropriations. Communities who are interested in this form of funding should have addressed their project with WFRC and have advanced planning for their projects.

- **Bikes Belong Grants**
  - This grant can be used to enhance the available areas for the use of bikes.
  - The money can be used as match for other grants.
  - Requires support letters from the local bicycle industry.
  - Foundation Grant limited to $10,000.

- **Corporate Giving**
  - Many Corporations have money to give to communities for projects that will enhance and better the community for which they service or for which their employees live or work.

- **Special Improvement Districts (SID)**
  - Either the City as a whole or areas of the City can vote to form a special improvement district which would assess each property owner an amount of money to pay for improvements such as sidewalks, street lighting, etc.

- **Utah Power Matching Funds**
  - Utah Power has a program that offers 50% matching funds for updating and replacing traditional incandescent bulbs in traffic signals and pedestrian signals to energy efficient LED inserts. This program expires in 2006.

- **"Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users" (SAFETEA-LU) - SR2S Program**
  - A program designed to provide funding for state and local communities to construct infrastructure related projects that will substantially improve the ability of students to walk and bicycle to school. Communities can apply for funding through the state to construct these improvements within 2 miles of a school.